# The Future of Scout and Cavalry Systems

**by Major Harold A. Buhl, Jr.**

What does the future hold for cavalry scouts? This question is increasingly unclear in today's environment. A HMMWV-mounted scout for a couple of more decades is a sobering thought. Perhaps more sobering is the thought that scouts are irrelevant in the future given intelligence assets that are increasingly more capable.

The case is the exact opposite. As our current experiences in Afghanistan and our interim brigade analyses have shown, robust manned reconnaissance has no technological equal. Many Army professionals agree that the ground scout is the most efficient, high-resolution, all-weather, continuously operating, on-site intelligent decisionmaking, intent-determining, and most timely terrain-retaining information asset for the commander to answer critical information requirements (CCIR). A scout is at that critical point in the battlespace where timely information gives the commander capability for immediate decisive action. In the new lexicon of doctrine, the scout is the point where the infosphere — the sum of relevant battlefield information — merges with the battlespace — the sum of battlefield geography, time, threat, and resources.[1] The infosphere must have high enough resolution to provide information dominance for the commander to execute shaping and subsequent decisive operations out of contact — a dangerous place to operate. This single fact is why some see the scout as an unnecessary risk.

Some Army professionals see networked unmanned systems becoming just as capable as the networked scout. Based on multiple studies and analyses, ground scouts can compensate for a loss of air scouts and intelligence surveillance assets, but these systems cannot compensate for a lack of ground scouts (see Figure 1).[2] While the commitment of scouts to force-oriented reconnaissance has higher risk than surveillance sensors, the payoff is exponentially greater. Air and ground scouts are the only reconnaissance assets available to the commander — in the pure sense of reconnaissance as a process.

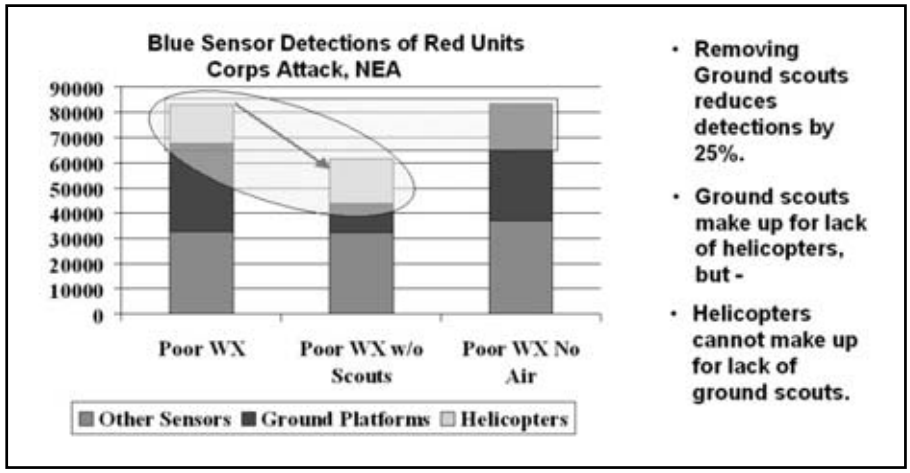


**Figure 1: The Unique Contribution of Ground Scouts (TRAC 2001)**

First postulate: ground scouts will remain critical to the commander throughout Army modernization and beyond. The search for an answer to the original question then becomes, what organization, tactics, and equipment do scouts need to maximize this benefit to the commander at tactical, operational, and strategic levels, and mitigate the risk he must accept. Truck-mounted scouts do not have on-the-move sensors, cavalry scouts do not have any reasonable stealth, and Stryker brigade reconnaissance incorporates both deficiencies — lack of on-the-move capability and reasonable stealth. At present, these three platforms are the only answer for ground scouts in the next decade and beyond.

Second postulate: scouts are at parity or are overmatched by the threat.[3] Without correction, scouts will continue to die short of the reconnaissance objective — the critical subspace in infosphere and battlespace where command information is most critical.[4] Solutions to this decades-long problem were sought in doctrine, organizations, training, ma-

teriel, leadership and education, personnel, and facilities (DOTMLPF). Across all these domains, experimentation failed to correct the deficiency. The result was a scout modernization strategy (see Figure 2) to work cooperatively across all domains. This strategy resulted in the short-term answer to scout parity with the Brigade Reconnaissance Troop, the Long Range Advanced Scout Surveillance System (LRAS3) for scouts, and the M3A3 Cavalry Fighting Vehicle (CFV) for cavalry. These solutions were seen as risk mitigation until a comprehensive scout materiel solution could be fielded — the Future Scout and Cavalry System (FSCS). Our British allies identified the same deficiency in their army — to a more time-critical degree. To correct this deficiency, two international consortia, comprising eight of the nine largest defense contractors in the United States and the United Kingdom, executed a combined Advanced Technology Demonstration (ATD). This demonstration has shown both nations the art of cutting-edge integrated solutions that will be fielded for scouts in 2008.

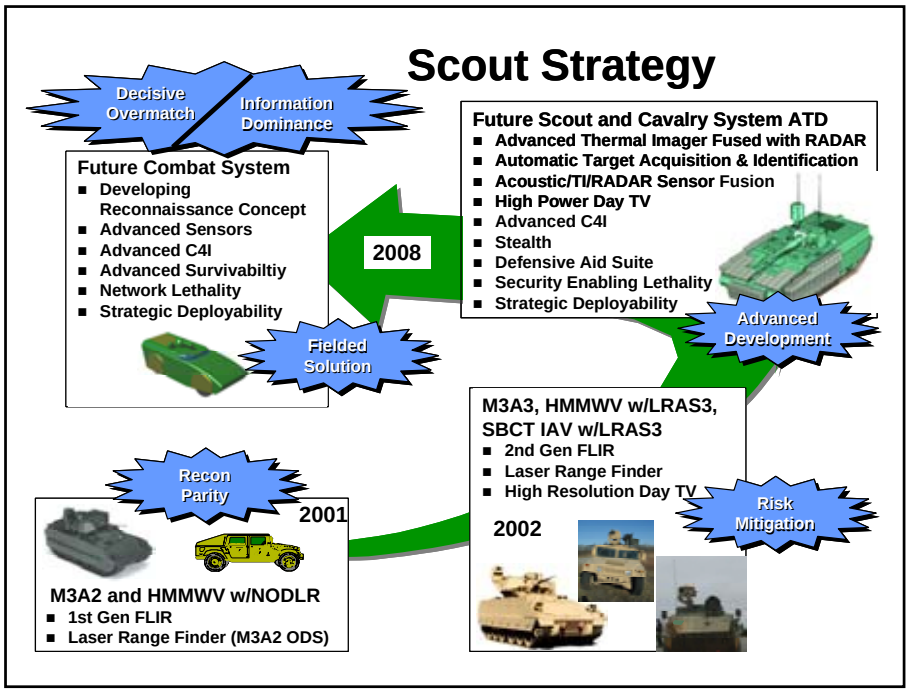


**Figure 2: Scout Modernization Strategy (USAARMC 2000)**

The short-term and risk-mitigating steps to correct the scout deficiency will remain acceptable until threat proliferation of second-generation forward-looking infrared (SGF) returns us to parity and threat overmatch.[5] At the force level, the Stryker Brigade Combat Team (SBCT) is the Army's short-term, risk-mitigating solution to deployability — lethality balance deficiency. The SBCT will rely on the Stryker family of vehicles for scouts. A Stryker recce variant will carry the LRAS3. The HMMWV, Bradley, and Stryker have been analyzed during operational simulations and composite technical studies.[6] The results firmly demonstrate that these three materiel solutions all fall short in correcting the scout deficiency beyond 2008. Thus, a materiel solution is required for commanders to exploit the promise of information dominance, thereby setting the conditions for shaping operations and enabling decisive operations.

Emerging doctrine seeks to develop the situation out of contact and shape the battlefield with effects, information, and resources to a decision timeline for the application of decisive maneuver.[7] This doctrine maintains as its basic key for success — the ability to set the conditions in the "red zone" with precision and generalized shaping effects, then enter and score in a decisive action. Defined by mission, enemy, terrain, troops, and time available (METT-T) and line-of-sight (LOS) weapons to be 3-to-5 kilometers (km) at present, the red zone is the final direct fire and contact area encompassing objectives. Given information operations, extended-line-of-sight (ELOS) weapons, beyond-line-of-sight (BLOS) weapons, and acquisition overmatch, the new red zone will approach 15km. The battlefield architecture will then define a tactical deep zone for higher echelon shaping operations and high payoff threat interdiction. Scouts — teamed as air and ground — are key enablers to establishing this expanded red zone, and serve as the commander's only responsive bridge between the red zone and tactical deep zone. NLOS and BLOS weapons for maneuver assets are a critical complement to the indirect fires and air-delivered effects in establishing this expanded red zone. In the tactical deep zone, conditions for operational success and strategic decisive points will require stealthy and highly capable manned reconnaissance.

Parallel and spiral development of doctrine with technology advances enables each domain to provide a capability greater than the sum of their parts. Enabling technologies — ELOS, BLOS, and acquisition overmatch — are well underway. Fire control systems, seeking munitions, and extended range sensors are all making advances. The synergy of these capabilities on the battlefield depends on designation and identification — a U.S. tenet for applying lethal effects. The current effort is to place these assets within integrated combat solutions that are in the right place in the battlefield geometries. To this end, we again find scouts as a fulcrum for the capability required. Scouts with acquisition overmatch and maneuver forces with NLOS/BLOS weapons have the flexibility to fight large-scale linear battles and nonlinear, noncontiguous small-scale contingencies. The materiel solutions that provide this capability to leaders and soldiers are programmed for fielding before the end of this decade. This timeframe remains critical, as it is the point where proliferated threat systems will overmatch our risk mitigating solutions — the truck- and Stryker-mounted LRAS3 and the M3A3. FSCS and the tank extended-range munitions (TERM) were the U.S. military's solutions to restore dominance over the threat in reconnaissance, security, and economy-of-force missions. However, FSCS and TERM programs are both terminating.

## Future Scout and Cavalry System

The FSCS ATD has centered on providing a scout solution that is dominant across the spectrum of conflict, can fight off-the-ramp of a C-130 for 48 hours, can identify the threat before it can detect us, is an adaptive network information node, leverages stealth technology, can survive a 3-to-1 counterreconnaissance engagement, is more mobile than threat and supported forces, can provide security and economy-of-force lethality, and has growth to be relevant throughout its life span.[8] Many

of these objectives sound similar to the Army Vision, which has proven both prophetic and detrimental to the FSCS ATD. The FSCS is responsive to the requirements for the Objective Force, but is no longer funded to move from the ATD into low-rate initial production and subsequent fielding.[9] The issue then, is how to correct existing scout deficiencies.

Below is an overview of FSCS requirements:

- **Multispectral RS3:** Identify the threat beyond the scout's recognition and weapons ranges.
- **C4I:** Exploit the fusion of sensors and data throughout the network.
- **Mobility:** Off road and high sustained road speed above the threat and supported forces.
- **Survivability:** Survive in close threat proximity and across the spectrum of conflict.
- **Lethality:** Exploit fleeting opportunities and retain self-defense.
- **Deployability:** Maintain strategic and operational flexibility of movement.
- **Reliability/Sustainability:** Minimize overhead to eliminate the logistics center of gravity.

The FSCS ATD sensor solution is a primordial spiral development that has integrated cross DOTMLPF synergy into the solution. Scouts with high-performance forward-looking infrared (FLIR) achieve threat standoff. Adding radio detection and ranging (RADAR), acoustics, and other technologies then fusing them to a cutting-edge FLIR, provides the scout with sensor overmatch — capability exceeding a single dimensional threat FLIR. This multispectral sensor suite is simplified by powerful onboard computing power, automatic target detection, and aided recognition software. This software then presents the scout with a single intuitive picture of all the sensor data, with symbols to draw attention to specific areas of heat, movement, and sound for human resolution. The elegance of an integrated scout solution is then achieved when this sensor overmatch is coupled with acquisition standoff provided by stealth and integrated signature management. Analysis shows that when sensor overmatch is teamed with acquisition standoff, an acquisition overmatch is achieved, which radically degrades threat capabilities. This means scouts dominate at all ranges, even if they are moving. Adding far-target location and target-designation capabilities with point-and-shoot network links provides scout-enabled effects to shape the battlespace, with human control, out of enemy contact. Analysis has shown that scout-enabled fires within acquisition overmatch provides significantly fewer friendly losses, greater decision time and space of the commander, and facilitates decisive maneuver.[10] To audit this effort, a parallel and independent ATD was executed to define a data set for a multifunctional staring sensor suite (MFS3). These data were to be the baseline for evaluation of FSCS sensor capability and possibly third-generation FLIR. MFS3 is transitioning to an off-platform hardware program, and has provided minimal audit data.

FSCS integration of cutting-edge technology continues beyond this centric scout capability. Advanced command, control, communications, computers, and intelligence (C4I) with gigabyte bandwidth is 100 times faster than desktop computers, and 1,000 times faster than the data bus on the M1A2 SEP. Commercial technology, such as *Firewire*, will be integral design components. Embedded training and onboard mission rehearsal will provide leaders the opportunity to train in the motor pool or plan and rehearse the battle in the attack position. Advanced medium-caliber cannon lethality solutions will enable the scout to provide security and economy of force, with significant dismount defeat capability. Modular armor will take the basic ballistic protection levels off a C-130 that require dedicated antitank weapons for penetration, and up-armor to protect against hand-held HEAT rounds and medium-caliber cannons. Advanced mobility provides tactical and operational dash capability in excess of threat and supported forces. Cutting-edge technology, like hybrid electric drives and drive by wire, provide reliable functionality integrated into a solution designed for 97 percent mission reliability.[11]

A significant point of concern in any manned reconnaissance solution is the number of scouts in the solution. While the low-tech Stryker is packed with as many as five dismounts, Legacy Forces have two dismounts per CFV and, in practice, only one per HMMWV. The acceptance of three scouts per HMMWV haunts the scout community. The other end of the spectrum — no scouts and no scout platforms — may be realistic someday, but not soon.[12] As such, FSCS considered a manned and unmanned balance within the capabilities of both throughout the next 20 years.

From analytic perspectives, minimizing manpower is always a challenge to balance against the operational necessity. Given the need for manned reconnaissance, a minimum of three men was considered necessary for endurance operations.[13] To effectively execute off-platform tasks, such as local security and manning observation posts (OP), and clear local critical points, such as hills, curves, and obstacles, two men were considered minimum. An empirical answer of five scouts per platform was the starting point. Considerations of the scout and cavalry mission set tended to increase manpower, while design and technology offered mitigation for smaller crews. The constraints of a C-130 deployable system include trade-offs between men and machine. The mission set is not tradeable. Soldiers require gear and supplies, which necessitate significant under-armor volume and additional weight. The machine has a C-130 and survivability induced limit on volume and weight. With the high-tech capabilities of mast-mounted sensors, manned OP time can be reduced. With future marsupial unmanned ground and air systems, clearing critical points can be done without a dismount drill, and comprehensive local awareness can be facilitated with proximity alarms. Thus, to balance between men and machine, while simultaneously protecting the mission, a three-man crew was recommended. User requirements relaxed to a four-man crew initially, with consideration for future marsupial unmanned systems. These unmanned ground and air systems were termed marsupial to define their relationship to the FSCS. In direct analogy to the biological definition, these systems would launch from the FSCS, move autonomously to their target areas, relay information, and be retasked to another target, loiter for surveillance, or return to the FSCS platform. Once recovered, these systems would latch and suckle at a port for additional programming and power before being launched on another mission set. With the limitations of a C-130 deployable system and the benefits of task reduction inherent in aided recognition, these

future marsupial unmanned systems' operational analysis supported a three-man-minimum crew (see Figure 3). Subject matter experts, including cavalry scout noncommissioned officers and officers, have been integral in the development from the beginning. Their impartial analysis also supports a three-man-minimum crew with a fourth scout highly preferred.

The integrated solution of FSCS has been remarkable in another way. Cost effectiveness is a primary concern of the Department of Defense and the Defence Procurement Agency of the U.K. The total cost of $428 million dollars to develop the FSCS has been shared at 33 percent U.S., 33 percent U.K., and 33 percent consortia. This cost and technology share is of great benefit to both nations, and exploits economies of scale. More directly at cost, with the C-130 constraint as the key design driver, all subsystems had to be balanced to achieve the required capability. This balancing resulted in the contractors abandoning the technique of maximizing performance of every subsystem. Sure, we could have better sensors, or more ballistic protection, or a bigger cannon, but to provide the capability a scout needs in the objective battlespace and fit on a C-130 with a 48-hour fight-off-the-ramp capability, serious and innovative design work and system balancing has provided an operationally effective solution, which by virtue of the design constraints is cost effective.[14]

## Future Combat System of Systems (FCS)

The materiel solution for the Objective Force and the current vision of a deficiency correction for scouts and cavalrymen is the FCS. This concept, like the Legacy Force and SBCT, is a cross-DOTMLPF force-level solution. The difference between FCS and the Stryker or Abrams, is an objective system outlining the capabilities to fully achieve the Army Vision. The realization of scouts and cavalry as reconnaissance, surveillance, target acquisition, and economy-of-force assets is but an integral piece of this holistic solution.[15] The RAH-66 Comanche has already been identified as the probable air component of the objective reconnaissance system.[16] Ground and air scouts are the commander's most effective tool for application of fires effects to shape the battlespace and the best facilitator for maneuver to decisively engage the enemy; however, details on the ground-scout solution are still to be determined. A lead system integrator has been designated for FCS to facilitate development for a milestone decision. During 2003, the FCS proposals will be reviewed at an acquisition milestone. The decision authority will then determine the timeframe and solutions for the Army over the next 50 years. At the end of the day, something will roll off an assembly line to gather information for the commander. Will this *thing* be an armored manned system or some combination of unmanned systems and close combat platform sensors? For scouts, this research development effort means a defined strategy on how to correct the scout deficiency with which we currently live and die.

The possibility of FCS being fielded by 2008 is not idle; however, it faces several challenges. Requirements degradation and schedule extension are two scout-specific concerns. Cost is fixed, thus forcing any FCS-program compromise to come in a watered-down capability, or push back production and fielding. FSCS lessons learned that demonstrate these risks and how to overcome them are integration engineering, systems balancing, and parallel manufacturing process development. Integrating components into subsystems, and subsystems into platforms that meet the requirements to fit into a C-130, is the primary engineering risk facing any development. FCS further complicates this risk by adding integration of platforms into a common solution set. The temptation to degrade and trade-off capabilities is great. The Stryker is a case in point — this nondevelopmental program initially thought to be C-130 transportable, now must sacrifice functionality to meet the critical C-130 gauge.[17] FSCS maintained requirement integrity with some difficult decisions.[18] This highly detailed integration consumed significant time, analysis, and engineering. Time is one resource in short supply for FCS — schedule is also a risk. The science and technology community will always have something better on the horizon — just give them some time and money.

While all programs face challenges, FCS faces even greater innovation challenges. Technologies that can be manufactured for the scheduled fielding require a lead-time that requires system-level decisions now. An example of this challenge is third-generation FLIR. We can make individual versions of third-generation FLIR — as currently defined — on a lab bench. The process technology to manufacture these sensor subsystems is, however, nonexistent. This fact prohibits counting on third-generation FLIR in the initial FCS. When these requirement and schedule challenges are dissected, "perfect" is not

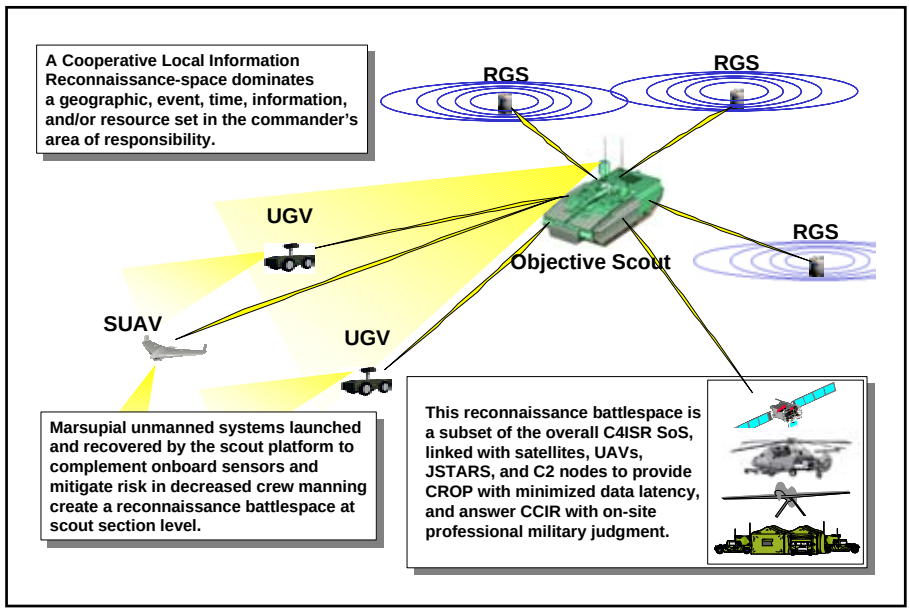


**Figure 3: FSCS within the C4ISR System of Systems (USAARMC 2000)**

attainable by 2008 and probably not by 2010.

Logically, one would think that since FSCS has already done significant work in line with FCS, it could be incorporated as risk mitigation into FCS. The FCS consortia teams and the objective force concept have at their disposal some of the deliverables of the FSCS ATD. The end result is uncertain. There is however, a one-year gap between the FSCS ATD and the FCS milestone decision. FSCS was developed in complement to Comanche, and FSCS is responsive to FCS requirements.[19] Should the milestone decision authority determine significant risk with FCS delaying schedule or degrading requirements, FSCS deliverables can be a risk-defeating option. However, the greater the delay, the less effective any integration and manufacturing advantage, as engineers are reassigned, hardware and production is mothballed, and studies and designs filed away. Using FSCS deliverables for risk mitigation is not a major issue. Under Federal Acquisition Regulation, part 6, it is a government right to do so. FSCS is not the perfect solution, but is borne out of analysis as a "good enough" capability.[20] Conceivably, troops, commanders, and taxpayers could have "good enough" in 6 years as opposed to "perfect" in 15 or more years.

We have a fleeting opportunity for an integrated solution to correct scout deficiencies and provide objective capability in this decade within the Army Vision. Assume we can no longer give scouts interim equipment fixes and require leaders and troopers to "make it happen." Information dominance for commanders is too critical to be overlooked. Key to the process of providing scouts with capable equipment, and the Army with dominant reconnaissance capability is leveraging technology to attain an integrated fieldable solution before threat overmatch. This critical timeline is hostage to the lead-time required of technology, integration, and manufacturing processes. Under these discussed constraints, our initial question — what does the future hold for cavalry scouts — has three possible solutions.

FCS is the preferred solution; if FCS triumphs over significant schedule and requirement risks, the question is moot. Second, if FCS challenges conspire to degrade requirements or delay schedule, a risk-mitigating answer and option is prudent. Given the need for information dominance to set the conditions for success, and that Comanche is expected to be the air reconnaissance component of Objective Force, a responsive ground scout solution would make sense as an initial phase of FCS. This initial phase would mitigate FCS program risk, solve the scout deficiency and establish the information dominance requirement. Finally, FCS shall be the solution regardless of schedule delay and requirements degradation. This solution risks accepting that the threat may overmatch our capabilities, while we are in pursuit of perfect solutions. For scouts, this risk can mean either HMMWV and Bradley against BMP-2 PIP or BM-2T with SGF, or a Stryker recce against a T-55 with modern fire control and SGF. Within the intelligence, surveillance, and reconnaissance infosphere, the threat will seek to apply local overmatches, such as asymmetry, mitigating our low-density standoff surveillance systems, such as unmanned aerial vehicles and joint surveillance target attack radar systems, and neutralize our reconnaissance to provide for their success.

Scouts are necessary, but currently lack the platforms and networks to succeed. The Objective Force is reliant on the condition of information dominance. An air-ground reconnaissance team can be ready to set this condition for the Objective Force. Leveraging FSCS under the FCS program with Comanche can deliver the literal and figurative scout for the Objective Force during this decade.

## Notes

[1]The Objective Force C4ISR Concept, 16 Nov 2001.

[2]Rand Studies 87, 93, 94, 95, 96, 98, RAND Corporation; NTC Trend Analysis 91-93; Desert Storm Lessons Learned; Center for Army Lessons Learned (CALL) 88, Fort Leavenworth, KS; U.S. Army Armor Center Studies 95-99, Fort Knox, KY; U.S. Army Training and Doctrine Analysis Center (TRAC), FSCS Combined Analysis Report 2001, Fort Leavenworth, KS; TRAC Combined Arms Reconnaissance Study 2000, Fort Leavenworth, KS; and IBCT Organizational Analysis 00-01.

[3]FSCS Combined System Threat Assessment Report, 2000.

[4]Rand Studies 87, 94, 98, NTC Trend Analysis 91-93.

[5]FSCS Combined System Threat Assessment Report, 00.

[6]TRAC FSCS Combined Analysis Report to the FSCS Combined IPR, January 2001.

[7]FM 3-0, *Operations*, U.S. Government Printing Office, Washington, DC, 14 June 2001; Whitepaper*: Concepts for the Objective Force*, November 2001.

[8]JROC validated FSCS Mission Needs Statement 30 April 1997; USAARMC and UK DEC ISTAR Approved Combined Operational Requirements Document, FSCS v 10.0, 2001.

[9]FSCS Combined Operational Requirements Document (CORD) v. 10.0, 2001, compared to Army approved FCS Mission Need Statement (MNS), 2 November 2001; and draft FCS Statement of Required Capabilities (SORC) 2 November 01.

[10]TRAC FSCS Combined Analysis Report to the FSCS Combined IPR, January 2001.

[11]FSCS Combined Operational Requirements Document, v. 10.0, 2001.

[12]Unmanned Ground Vehicle (UGV) Demo III, 00-01.

[13]Director of Requirements – Land, UK Ministry of Defence Studies.

[14]User Brief to FSCS Affordability Review Panel, 1 February 2001.

[15]FM 17-95, *Cavalry Operations*, U.S. Government Printing Office, Washington, DC, 24 December 1996.

[16]The Army Modernization Plan, Department of the Army, 2002.

[17]Frank Tiboni, "Most New Armored Vehicles Exceed U.S. Army's Medium-Weight Needs," *Defense News*, 4 March 2001, p. 6.

[18]c.f. paragraph under FSCS - crew size.

[19]Army approved FCS Mission Need Statement 2 November 2001; draft FCS Statement of Required Capabilities, 2 November 2001.

[20]Federal Acquisition Regulation, Part 6, pp. 302-2, 3,4,6,7.

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